Xuemin Chi

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Education

Zhejiang University **Sep. 2020 – Mar. 2024**

Ph.D. candidate in Control Science and Engineering *Hangzhou, China*

- **SCORE: 87/100**
- **Relevant Coursework:** Nolinear Control Theory, Robust Control Theory, Computataional Methods in Science and Engineering, Linear System Theory, Model Predictive Control
- **Awards:** Freshman Scholarship(Top 3%), Academic Scholarship

Dlian University of Technology **Sep. 2017 – Jun. 2019**

M.S. in Vehicle Engineering *Dlian, China*

- **SCORE: 82/100**
- **Relevant Coursework:** Finite Element Method and Application, Matrix and Numerical Analysis, Vehicle Safety Assisted Driving Technology, Advanced Technology of Modern Automobile
- **Awards:** Postgraduate Second Class Scholarship

Shenyang University of Technology **Sep. 2013 – Jun. 2017**

B.S. in Vehicle Engineering *Shenyang, China*

- **SCORE: 85/100(Rank: 3/120)**
- **Relevant Coursework:** Finite Element Method and Application, Matrix and Numerical Analysis, Vehicle Safety Assisted Driving Technology, Advanced Technology of Modern Automobile
- **Awards:** 1st prize in Challenge Cup of Province(Top 1%), 2nd in The 19th 'FLTRP CUP' National English Debating Competition(Top 1%), First Class Scholarship(Top 5%), Distinguished Student(Top 1%)

Contribution and Research Interests

The main contribution of my research is to develop graph-based search and learning-based predictive control methods that are able to safely and efficiently handle complex environments for self-driving cars. Research interests include:

- Graph Search
- Convex Optimization
- Reinforcement Learning
- Model Predictive Control

Research Experience

Motion Planning in Tight-Environment Considering Dynamic Obstacles **Sep. 2020 – Present**

Ph.D. *Hangzhou, China*

- The upper layer contains two parts. The first part is path planning with proposed Scenario-based hybrid A* (SHA*), and the second part is to extract speed profile by a simple optimal control problem and finally outputs a trajectory.
- The lower layer mainly handles dynamic obstacles, and the coarse upper result is regarded as reference trajectory. The accurate collision avoidance in the thigh-environment is modeling by duality theory. A nonlinear MPC controller (SHA*-NMPC) is designed to fulfill the motion planning.
- **Working Paper: Xuemin Chi**, Zhitao Liu, Jihao Huang, Feng Hong, Hongye Su. RMPC-based Motion Planning in Tight and Dynamic Environments [J]. IEEE Transactions on Intelligent Vehicles, journal, 2022
- **Working Paper: Xuemin Chi**, Zhitao Liu, Jihao Huang, Feng Hong, Hongye Su. A Duality-based Time-Continuous Collision Avoidance Method [J]. IEEE Transactions on Intelligent Vehicles, journal, 2022
- **Submitted: Xuemin Chi**, Zhitao Liu, Jihao Huang, Feng Hong, Hongye Su. Optimization-Based Motion Planning for Autonomous Parking Considering Dynamic Obstacle: A Hierarchical Framework [C]. Chinese Control and Decision Conference, 2021
- **Submitted:** Jihao Huang, Zhitao Liu, **Xuemin Chi**, Feng Hong, Hongye Su. Search-based Path Planning Algorithm for Autonomous Parking: Multi-Heuristic Hybrid A* [C]. Chinese Control and Decision Conference, 2021
- **Submitted:** Tao Chen, Zhitao Liu, **Xuemin Chi**, Hongye Su. "Attack Detector with Command Governor for Remote Estimation" [J]. Automatica, Journal, 2021

MPC for Autonomous Vehicles Trajectory Planning **Sep. 2019 – Sep. 2020**

Gap *Hangzhou, China*

- A MPC planner is designed to achieve trajectory planning based on a nonlinear kinematic model. The final NLP is solved by the general NLP solver 'IPOPT' .
- A MPC planner is designed to achieve trajectory planning based on a linearized kinematic model under low speed, simulated by Matlab and Carsim. The planner works fine under 10 m/s.
- Based on a vehicle dynamic model and the pacejka tire model, A linear MPC controller is designed to fulfill the trajectory planning task. The planner can handle high-speed scenarios, such as speeds of 20m/s or 30m/s.

ANN for Optimal Parameters Prediction **Sep. 2018 – Jun. 2019**

M.S. *Dalian, China*

- The steel is machined to the size of a standard part by CNC machine tools, and then the standard part is taken for tensile testing, and the performance of the parameters is recorded through different parameter variations and combinations
- After training RBFNN and BPNN with the experimentally obtained data and predicting the optimal processing parameters, the parameters are then used to do experiments for validation.
- **Publication:** Chi X, Han S. Effects of Servo Tensile Test Parameters on Mechanical Properties of Medium-Mn Steel[J]. Materials, 2019, 12(22): 3793. (IF = 3.63)

Skills

Languages: English(GRE 326 + 3.5; IELTS 6.5), Chinese
Engineering Software: Matlab, Carsim, ROS, Catia, Solidworks, Abaqus
Programming: Python, Julia, C++